

X-ray Filter Inserter and Filter/Shutter

OVERVIEW

The Model PF4 is designed to reproducibly attenuate an x-ray beam by inserting up to four filter foils under remote manual or computer control. The foils are moved by miniature pneumatic actuators controlled by electrically operated valves. Each foil is mounted on its own carrier (see photo), which is held in place by a single snap ring. Foils are thus easy to change without removing the instrument body from the beam path. As a result of careful design, the entire instrument is very compact.

In the Model PF2S2, thick absorber blades replace two filters to form a focal plane shutter. This gives a more uniform spatial exposure than does a single bladed shutter which opens and closes. Minimum exposure times of less than 0.1 sec are not difficult to produce.

Both PF4 and PF2S2 mate with Blake Industries' line of beam path components and can operate evacuated or He filled, as the actuator shafts are O-ring sealed. Either model can be retrofitted as the other.

FEATURES

- *PF4*: 4 filters, 2 cm square aperture
- *PF2S2*: 2 filters and 2 shutters, aperture 2 cm W by 8 mm H
- Pneumatically actuated
- Low power electrically controlled
- Easy filter changes

EXPOSURE CONTROL

Detector linearization and protection

The Model PF4 is particularly useful for synchrotron radiation experiments where a detected x-ray intensity may vary over several orders of magnitude. The experiment is then optimized for acceptable counting rates with weak signals and filters are inserted to retain detector linearity in the presence of strong signals. Examples include surface reflection studies, diffraction from both normal and *forbidden* peaks, Huang scattering near diffraction peaks, etc. Using the PF4, these experiments can be completely automated.



Count rate normalization

In routine data collections for many samples, the PF4 can conveniently match the detector's linear range to sample scattering strengths even if they do not vary widely during the experiment. This allows the spectrometer to be *tuned* to the sample in a standardized and reliable manner.

Calibrated attenuations

The ease of changing filters encourages the creation of standard, calibrated filter sets on their own foil carriers for common operations at different energies. This results in reliable and reproducible attenuation ratios from experiment to experiment. (Order PF-4FC foil carriers.)

Exposure control

With a properly graded filter set, the PF4 also provides a simple way to adjust exposure in experiments requiring a particular x-ray dose (eg. topography photographs). This capability is further enhanced by the Model PF2S2, which allows timed x-ray exposures as well.

Beam shutter implementation

The PF2S2 (or the PF4 with a heavy absorber replacing one foil) is a convenient way to minimize damage to radiation sensitive samples by restricting exposure to only those times when data is actually being collected. In laboratory systems this is also an easy way to implement a stopper for safety reasons too.

SPECIFICATIONS

Physical dimensions:

SIZE: 100 mm in line, 62 mm wide, 200 mm high.

X-RAY BEAM APERTURE

PF4: 20 mm high by 20 mm wide.

PF2S2: 8 mm high by 20 mm wide.

Foil carriers(4):

Single snap ring mounted & easy to change. Accepts foils up to 3 mm thick.

Shutter blades:

MATERIAL: Stainless steel, 0.125" thick. Blades in other materials are easily user fabricated.

NUMBER SUPPLIED: 2 with PF2S2.

Pneumatic:

CONNECTION: 6 mm or 1/4" dia tubing.

SUPPLY: 50 to 100 psi (3.5 to 7.0 bar) compressed air, 5 mm filtered, unlubricated.

Electrical:

SUPPLY: 24 V DC, 23 mA per valve.

CONNECTOR: Subminiature 9 pin male D Plug Mates to 9 pin female D Receptacle.

ORDERING INFORMATION

Weight: Shipping: 3.0 lbs; Net: 1.5 lbs.

Warranty: One year

Prices: Per Current Price Sheet

RELATED PRODUCTS

PF-CAB-xx connector cables

9 conductor shielded cables (26 AWG, 4 twisted pairs & ground) with M&F DB9 connectors to connect a PFCU-4 to PF4 filter unit or PF2S2 filter-shutter unit. Available lengths xx are 15', 25' & 50'.

PFCU-4 control unit

A NIM mounted manual/computer interface control unit for either the PF4 or PF2S2. Valves operate by front panel switches or external 5V logic signals. Front panel lights indicate actuator positions.

PF-4FC foil carriers

A set of 4 additional foil carriers with assembly hardware, installation tool and additional clip rings. Especially useful for creating sets of calibrated foils.

Conversion kits

PF4-XS2: Converts PF4 to PF2S2.

PF2-XF4: Converts PF2S2 to PF4.

X-ray Instrumentation Associates

8450 Central Ave., Newark, CA 94560 USA

© XIA, August 2003

510.494.9020 (tel)

510.494.9040 (fax)

www.xia.com

Email inquiries: sales@xia.com